

# PATENT SPECIFICATION

DRAWINGS ATTACHED

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930.405



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## COMPLETE SPECIFICATION

### Improvements in or relating to the Feeding of Articles from a Bulk Supply to a Conveyor

We, ROSE BROTHERS (GAINSBOROUGH) LIMITED, a British Company, of Albion Works, Gainsborough, in the County of Lincoln, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to the feeding of articles from a bulk supply to a conveyor, and is particularly, though not exclusively, concerned with the feeding of rectangular articles, e.g., toffees, an object of the invention being to feed the articles to the conveyor singly one behind another.

According to the present invention, there is provided an apparatus for the above purpose comprising a hopper of substantially frusto-conical shape, a feed tube pivotally mounted in and extending through the wall of the hopper for movement about its longitudinal axis to form a feed passage leading from the interior to the exterior of the hopper, an annular step formed on the inner surface of the tube some distance from the inner end thereof, the axis of the tube being inclined to the horizontal and the inwardly protruding end face of the tube being inclined to a diametral plane of the feed tube, and means for pivoting the tube, the delivery conveyor being arranged substantially immediately below the delivery end of the tube.

The tube is conveniently of substantial length, e.g., several times its diameter, and although the angle of the tube may vary considerably, an angle of about 20° has been found satisfactory. Conveniently the tube is rotatable and the rate of rotation should be such as to allow the articles to flow along the tube without undue interference from centrifugal force. The speed of the delivery

conveyor is preferably such as to forward each article clear of the succeeding article so as to avoid interference between the article at the tube outlet.

To assist in orientating the articles as they flow down the tube, a distinct annular step is provided in the tube some distance from the inner end, such a step being conveniently provided by the insertion of a sleeve finished flush with the inner end face of the tube.

The tube may pass into the hopper at the base, and the inner end face of the tube is preferably so inclined that, in one position of rotation, it lies substantially normal to the mean axis of the hopper.

A feeding apparatus constructed as described above has been found very useful in feeding square toffees (each previously wrapped) on to a band conveyor in single file, any slight misalignment between adjacent end faces of the toffees on the conveyor being corrected by a tapered entrance to a guiding channel on the conveyor.

A plurality of band conveyors may be arranged side by side, the plurality of conveyors being conveniently constituted by a common band conveyor of a width appropriate to the desired number of individual conveyors, there being arranged over the common band a series of side guides to provide a number of separate lanes each constituting a separate conveyor. In such a case, each lane may be fed from a separate hopper having a rotatable feed tube as described above.

A convenient arrangement when using a plurality of conveyors in the above manner is to arrange the feed tubes with their axes lying transversely to the direction of movement of the conveyors, the tubes being conveniently arranged on both sides of the group

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of conveyors. With such an arrangement, the tubes on both sides of the conveyors are spaced along the length of the conveyors and extend laterally in progression over successive conveyors, e.g., over successive lanes on a common band. In this manner, although the common band must extend lengthwise to the last pair of feed tubes, the lanes themselves may be progressively shorter in the direction of movement of the conveyors.

The feed tubes may be connected by gearing to individual countershafts driven by a common driving shaft, the countershafts each having an electromagnetically operated clutch responsive to a feeler arranged to be lifted by the articles in the channel fed by the tube controlled by that clutch, the feeler being operative to actuate the clutch to cause rotation of the countershaft as the feeler falls into engagement with the band surface.

The apparatus described above is very useful when it is desired to form batches of sweets each containing a variety of flavours, the separate lanes being fed with the different varieties. Such batches may then be fed to a wrapping machine as described, for example, in Specification No. 43621/59 (Serial No. 927,460).

By way of example, the invention will now be described in greater detail with reference to the accompanying drawings, in which:—

Figure 1 is an elevation of part of an apparatus for forming batches of sweets for forwarding to a wrapping machine,

Figure 2 is a plan of the apparatus shown in Figure 1, and

Figure 3 is a section on the line 3—3 in Figure 1.

Referring first to Figure 3 a hopper 11 of substantially frusto-conical shape is secured at its base to a throat member 12 bored for the passage of a feed tube 13 to form the outlet from the hopper 11, the axis of the tube 13 lying at an angle to the horizontal of about 20° and having its inner end face 14 inclined at such an angle to the diametral plane of the tube that, in one position of rotation, it lies substantially normal to the axis of the hopper 11.

The tube 13 is rotatably mounted at the hopper end in a bearing 16 formed in the throat member 12 and at the opposite end in an outboard bearing 17 secured to a supporting frame 18. The tube is provided with a pulley 19 connected by a belt 21 to a driving pulley 22 secured to a countershaft 23 rotatably mounted in the frame 18 and connected by gearing 24 to a driving shaft 26 mounted in bearings 27 secured to a main supporting beam 28, the shaft 26 being connected by bevel gearing to a main shaft 29 driven by chain gearing 30 from a motor (not shown).

Arranged transversely at the outlet of the

tube 13 is an endless delivery conveyor band 31 on to which sweets 32 (which in this example have been individually wrapped) pass from the outlet of the tube 13, the band 32 being supported by a platform 33, and to assist in orientating the sweets as they flow down the tube 13, a distinct step 34 is provided in the tube by the insertion of a sleeve 35 finished flush with the inner end face 14 of the tube.

The rate of rotation of the tube 13 may vary in accordance with different conditions but in any case must be such as to allow the sweets to flow along the tube without undue interference from centrifugal force. The speed of the conveyor band 31 is such as to forward each sweet 32 separately clear of the tube so as to avoid interference between the sweets at the tube outlet.

As illustrated in Figure 3, the conveyor band 31 is divided into a plurality of lanes 36 (in this example fourteen) by side guides 37, and a separate tube 13 and hopper 11 is provided for each lane, the tubes and hoppers being arranged on both sides of the conveyor in lengthwise spaced relationship, the tubes on each side extending laterally in progression over successive lanes 36, the guides 37 being progressively shorter in the direction of movement of the band 31. The hoppers 11 and tubes 13, together with mounting and driving mechanism are identical in construction and function, the driving shaft 26 being common to the various countershafts 23.

The common band 31 forwards the sweets 32 over a dead plate 38 to a further common endless band 39, similarly divided into lanes 41 by the guides 37, for final delivery to a pocketed conveyor (not shown) of a wrapping machine, one complete line of sweets 32 being transferred to each pocket of the wrapping machine conveyor for forming into a single package, the lines being formed into batches and transferred, for example, as described in Specification No. 43621/59 (Serial No. 927,460).

The band 31 is driven at a faster rate than that of the band 39 so as to ensure that the sweets in the lanes 41 of the band 39 are arranged in close files, and in order to control the rate of flow of the sweets 32 from the tubes 13, a series of feelers 42 are arranged one in each lane 36 of the band 31 to detect gaps in the files of sweets, each feeler 42 upon such detection, actuating a micro-switch 43 controlling the operation of a clutch 44 in the corresponding countershaft 23, the clutch serving to start (or stop) rotation of the tube 13, there being one clutch 44 for each tube 13.

WHAT WE CLAIM IS:—

1. Apparatus for feeding articles from a bulk supply to a delivery conveyor comprising a hopper of substantially frusto-conical shape,

- a feed tube pivotally mounted in and extending through the wall of the hopper for movement about its longitudinal axis to form a feed passage leading from the interior to the exterior of the hopper, an annular step formed on the inner surface of the tube some distance from the inner end thereof, the axis of the tube being inclined to the horizontal and the inwardly protruding end face of the tube being inclined to a diametral plane of the feed tube, and means for pivoting the tube, the delivery conveyor being arranged substantially immediately below the delivery end of the tube.
- 5 2. Apparatus as in Claim 1, wherein the tube is of substantial length, and the angle of the tube is of the order of  $20^{\circ}$ .
- 10 3. Apparatus as in either of Claims 1 and 2, wherein the tube is rotatable and the rate of rotation is such as to avoid undue interference from centrifugal force.
- 15 4. Apparatus as in any of the preceding claims, wherein the step is provided by the insertion of a sleeve into the tube, the sleeve being finished flush with the inner end face of the tube.
- 20 5. Apparatus as in any of the preceding claims, comprising a plurality of conveyors constituted by a common band conveyor of a width appropriate to the desired number of individual conveyors, there being arranged over the common band a series of side guides to provide a number of separate lanes each constituting a separate conveyor.
- 30 6. Apparatus as in Claim 5, wherein the feed tubes are arranged with their axes lying transversely to the direction of movement of the conveyors, the tubes being arranged on both sides of the group of conveyors in spaced relationship lengthwise of the conveyors, the tubes extending laterally in progression over successive conveyors.
- 35 7. Apparatus as in any of the preceding claims, wherein each feed tube is driven through an electromagnetic clutch responsive to a feeler adapted to be actuated by the articles on the conveyor.
- 40 8. Apparatus for feeding articles from a bulk supply to a conveyor, substantially as described with reference to the accompanying drawings.
- 45 50
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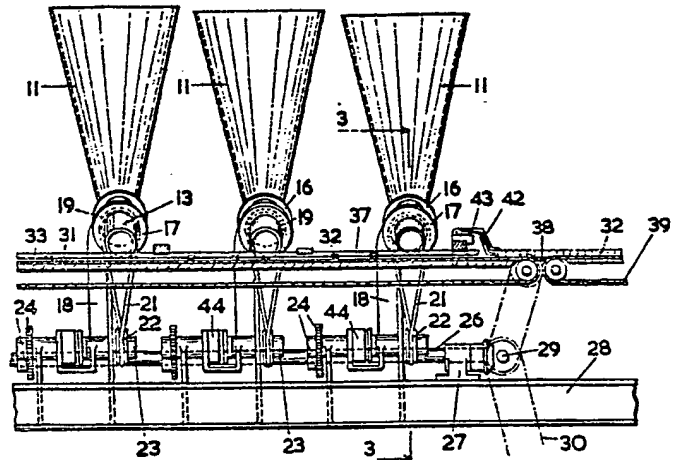


FIG. 1.

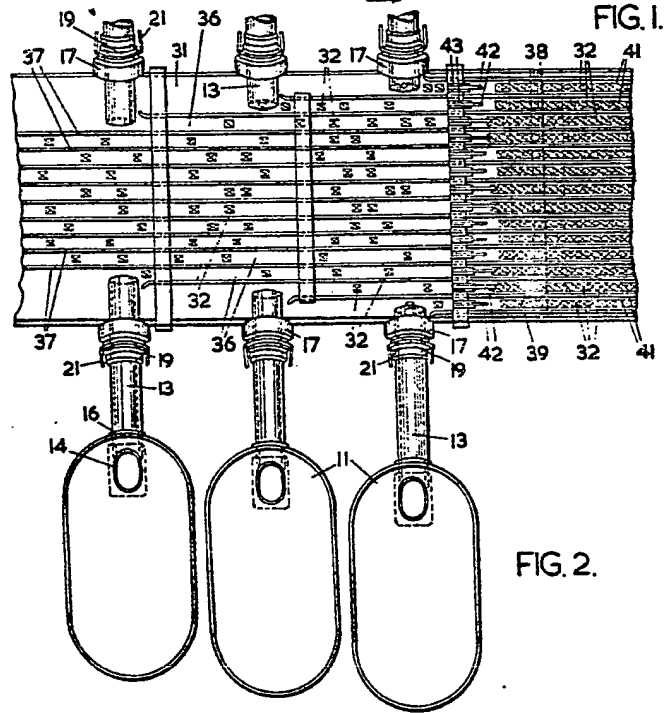


FIG. 2.

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COMPLETE SPECIFICATION

2 SHEETS

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Sheets 1 & 2*

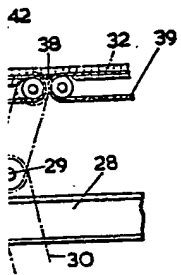


FIG. 1.



FIG. 2.

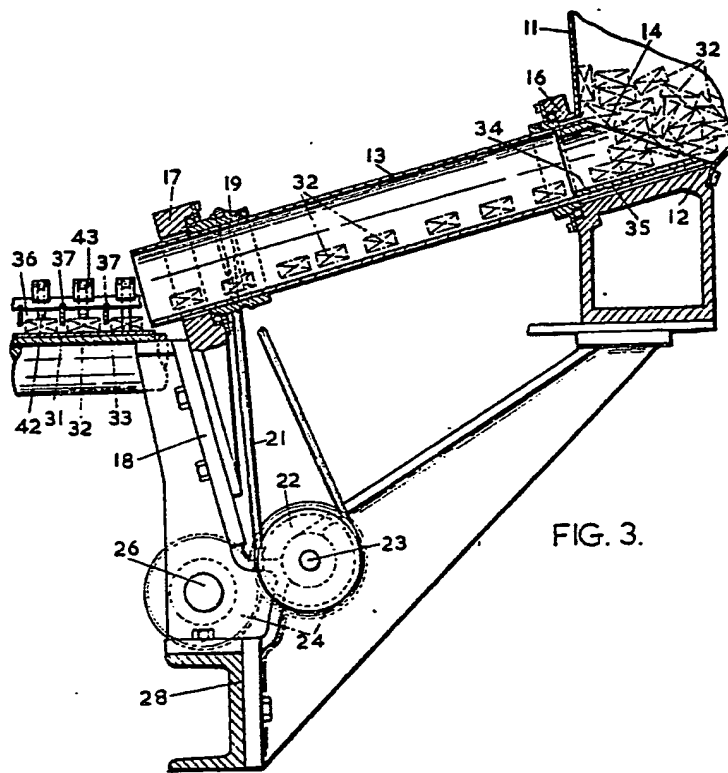


FIG. 3.

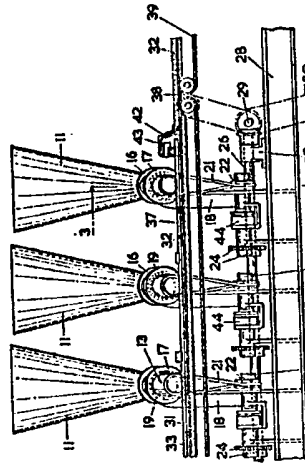


FIG. 1.

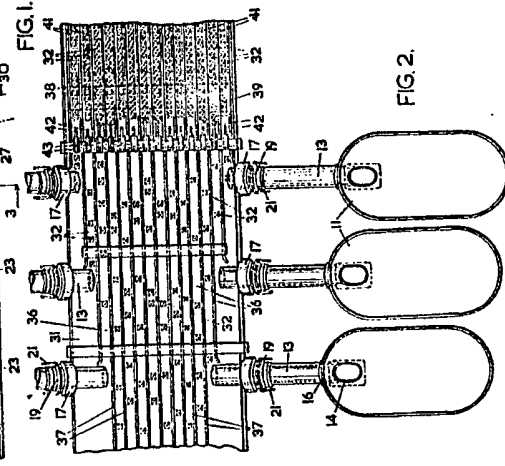


FIG. 2.

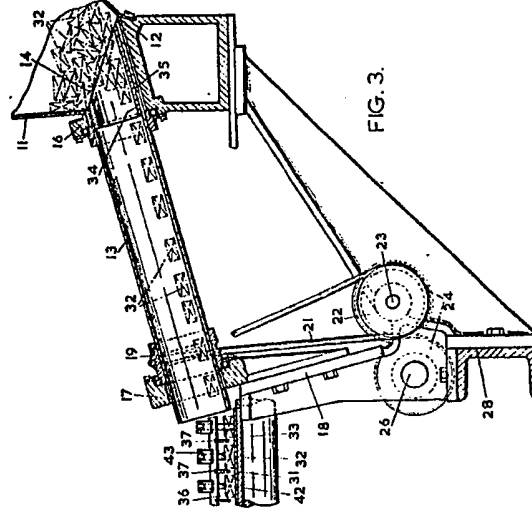


FIG. 3.

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